

**Massachusetts Institute of Technology**  
**Department of Physics**

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**Condensed Matter Theory Seminar**

"Phase diagram of interacting spinless fermions on the honeycomb lattice"

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**Abstract:** Fermions hopping on a hexagonal lattice represent one of the most active research field in condensed matter since the discovery of graphene in 2004 and its numerous applications. Another exciting aspect of the interplay between geometry and quantum mechanical effects is given by the Haldane model where spinless fermions experiencing a certain flux pattern on the honeycomb lattice leads to the stabilization of a topological phase of matter, distinct from a Mott insulator and dubbed Chern insulator nowadays. In this context, it is crucial to understand the role of interactions and this seminar will describe recent results that have been obtained for a minimal model, namely spinless fermions with nearest and next-nearest neighbour density-density interactions on the honeycomb lattice at half-filling.

Refs:

\* S. Capponi & A. Läuchli, Phys. Rev. B 92, 085146 (2015)

\* S. Capponi, eprint arXiv:1609.01161

**12:00pm**  
**Tuesday, October 4, 2016**  
**Duboc Room (4-331)**